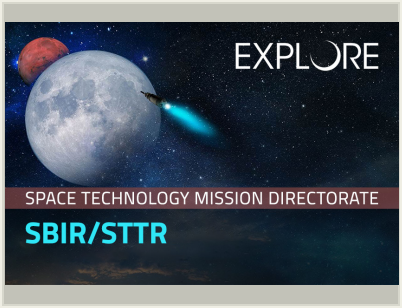
Fiber-Optic Etalon Pressure Sensor System with High Thermal and Mechanical Stabilities, Phase I

Completed Technology Project (2007 - 2007)

Project Introduction

Atmospheric pressure sensing in particular is of critical importance to any attemp of Mars landing. Pressure sensing has traditionally always drawn high interest from the military due to its applications to high-performance military airplanes and helicopters, missiles and ballons. Aerodynamics also find its applications in civilian aviation. After over 100 years of research and development, most powered aerodynamic experiments can be accurately simulated numerically on a computer today. However, aerodynamic experiments and measurements are still needed for the input parameters to the simulation, for the final verification of results and routine monitoring of performance. As a matter of fact, precision aerodynamic measurements gain ever higher importance today than before. There are 3 special challenges of measuring pressure on Mars: (1) the thin atmosphere requires high ensitrivity sensors; (2) the extreme temerature range; and (3) the survival of the landing impact. This proposal address them all. At home on the Earch, air pressure measurements reveal a lot of useful information about aircraft engine performance, about the air flow on aircraft wings, about the on-blade dynamic pressure of a helicopter, and about the optimal design and motion of a parachute among other things. The unique advantage of our solution lies in its high stability against temperature variations and mechanical disturbances, rendering the proposed system rugged and robust enough for Mars landing and exploration while keeping the cost at the level of commercial off the shelf fiber-optic communications systems. In Phase I of this program, we propose to demonstrate a bench-top system with several high-sensitivity etalon pressure sensors with high temperature and mechanical stability. In Phase II, we will develop the complete pressure sensor system using existing fiber optic components with monitoring and feedback control software.



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Langley Research Center (LaRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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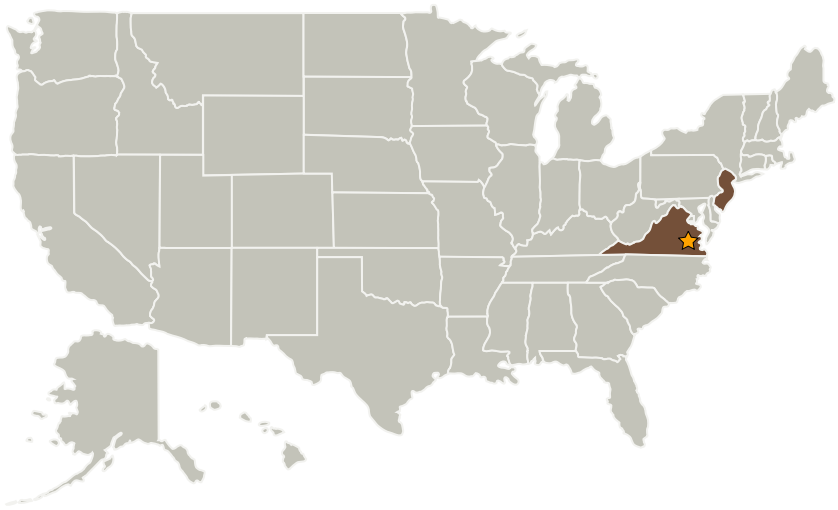
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Langley Research Center(LaRC)	Lead Organization	NASA Center	Hampton, Virginia
Structured Materials Industries, Inc.	Supporting Organization	Industry	Piscataway, New Jersey

Primary U.S. Work Locations	
New Jersey	Virginia

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.3 In-Situ Instruments and Sensors
    - TX08.3.4 Environment Sensors